

Deaths and Injuries from Contact with Electricity

Data from the U.S. Bureau of Labor Statistics show that, in 1999, electrocution was the third-ranking cause of death in construction, after falls to a lower level and highway traffic injuries. Electrocutions caused 11% of the 1,228 construction worker deaths.

Like falls to a lower level, contact with electricity often kills. Contact with electricity made up only 0.6% of reported recordable nonfatal construction injuries in 1999.¹

For 1997-99, the death rate from electrocutions for the construction industry was 1.7 per 100,000 full-time-equivalent workers. The highest rates from electrocution in construction were among electrical power installers and repairers and electricians (chart 40a). (Statistics on deaths over the three years 1997-99 were averaged to produce numbers large enough to be statistically reliable.)

For 1997-99, there was an average of 147 electrocutions per year. The construction occupations with the highest average number of deaths per year due to electrocution were electricians (40), construction laborers (26), supervisors (10), carpenters (7), and electrical power installers and repairers (7).

The causes of electrocutions in construction are different for electrical workers (electricians, electrical power installers and repairers, electrical apprentices, and helpers doing electrical work, and their supervisors) and non-electrical workers.² The main cause of electrocution of electrical workers from 1992-99 was contact with "live" (energized) equipment and wiring (chart 40b). The hazard results mostly because of a failure to de-energize and lock out or tag out electrical equipment and wiring. Working live on light fixtures, especially 277-volt (fluorescent lighting) circuits, caused a large percentage of electrocutions, as well.

For non-electrical workers, the main cause of electrocution was contact with overhead power lines (chart 40c). Failure to lock out or tag out machinery and appliances before working

on them and lack of ground fault circuit interrupters caused many of the other electrocutions.

Contact with energized objects means touching objects that can carry current as a result of their own contact with live parts of equipment and wiring. Incidents included accidentally drilling into or cutting live wires and touching wires, metal ladders, pipes, and hand and power tools that had contacted live circuits.

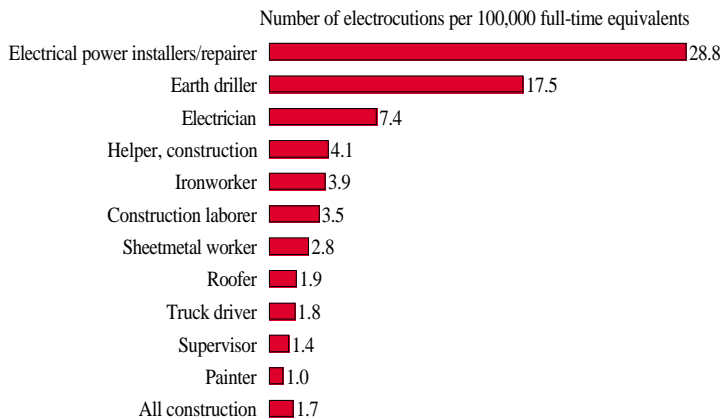
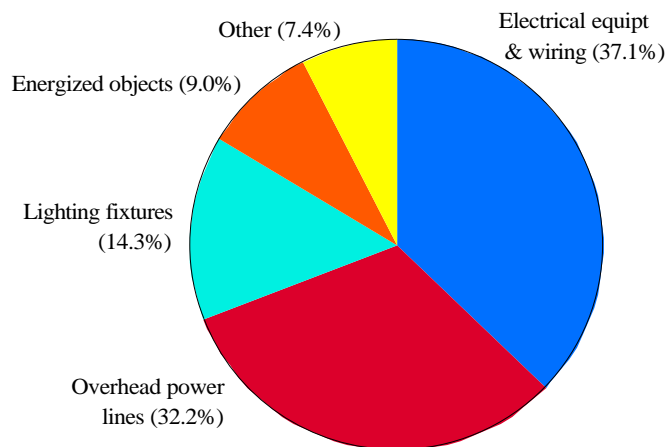
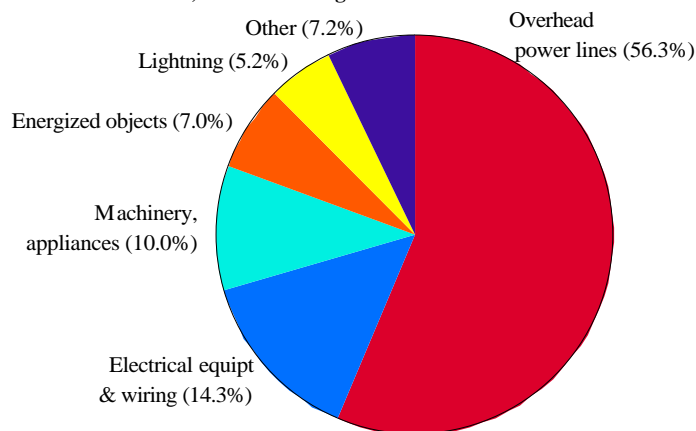
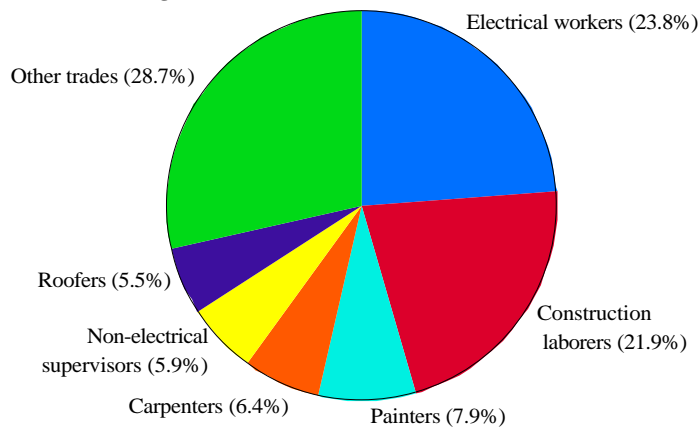
Overall, contact with overhead power lines was the main cause of electrocution from 1992-99, causing 547 deaths (48%), or 68 per year. Among the trades, electrical workers had the greatest percentage of overhead power line electrocutions, closely followed by construction laborers (chart 40d). Although heavy equipment often contacts overhead power lines, heavy equipment operators suffered only 3% of the electrocutions from overhead power lines, because much heavy equipment, such as cranes, is insulated from the ground.

The types of electrical injury include electric shocks, electrical burns (from contact with electrical current), heat burns (from arc flashes and blasts), arc blast effects (hearing loss and physical injury), and falls (as a result of electric shocks). Electric shock causes most deaths tied to contact with electricity. In 1992-99, 1,139 deaths were confirmed as caused by electric shock, compared with the other cause of electricity-related death, arc flashes or blasts, known to have resulted in 24 deaths.

There are no good statistics on a similar breakdown of electrical injuries. One study of visits by construction workers to an urban hospital emergency room from 11/90 through 1998 identified 19 arc flash or blast injuries out of 61 construction electrical injuries (31%). The same study found that 15 of the 42 electric shock injuries also involved falls (including two jumps) from ladders as a result of the electric shock.²

1. Bureau of Labor Statistics, www.bls.gov/iif/oshcdnew.htm, table R64.

2. Research by Michael McCann, Katherine Hunting, Risana Chowdhury, Judith Murawski, and Laura Welch on causes of electrical deaths and injuries among construction workers, 1990-99. Submitted for publication

40a. Rate of deaths from electrocutions, selected construction occupations, 1997-99 average**40b. Breakdown of causes of electrocutions among electrical workers in construction, 1992-99 average****40c. Breakdown of causes of electrocutions among non-electrical workers in construction, 1992-99 average****40d. Overhead power line electrocutions in construction, by occupation, 1992-99 average**

Note: Chart 40a - Full-time is defined as 2,000 hours worked per year. Total of 440 electrocutions. Number of deaths in each category: electric power installer, 20; earth driller, 9; electrician, 120; helper, 12; ironworker, 6; laborer, 79; sheetmetal worker, 6; roofer, 11; truck driver, 10; supervisor, 30; painter, 13. (Occupational categories are as follows: Electrical power installers/repairers, earth drillers, helpers (helpers, construction only), construction laborers, roofers, truck drivers, and painters include only those trades. Ironworkers include only structural metal workers. Electricians include electricians and their apprentices. Sheet metal workers include sheet metal workers, their apprentices, and sheet metal duct installers. Supervisors include only construction supervisors [occupational codes 503, 553- 558].)

Chart 40b - "Other" includes contact with electric current of machinery, appliances and power tools, and contact with underground, buried power lines. Deaths counted only among electrical workers in the construction industry (SIC 15, 16, and 17). Total of 391 electrocutions.

Charts 40b and 40c - Electrical equipment includes electrical control panels, switching equipment, transformers, circuit breakers, and junction boxes.

Chart 40c - Machinery and appliances also includes power tools and portable lights. Other includes contact with underground, buried power lines and contact with electric current of light fixtures. Total of 748 electrocutions.

Chart 40d - Electrical workers includes electricians and their apprentices, helpers doing electrical work, electrical power installers and repairers, and supervisors of electricians and electrical power installers. Other trades include heavy equipment operators, truck drivers, earth drillers – about 3% each – and ironworkers, managers and administrators. Total of 547 deaths.

Source: All charts - Based on data from the Census of Fatal Occupational Injuries and the Current Population Survey, both BLS. Calculations by Michael McCann and Risana Chowdhury, The Center to Protect Workers' Rights.